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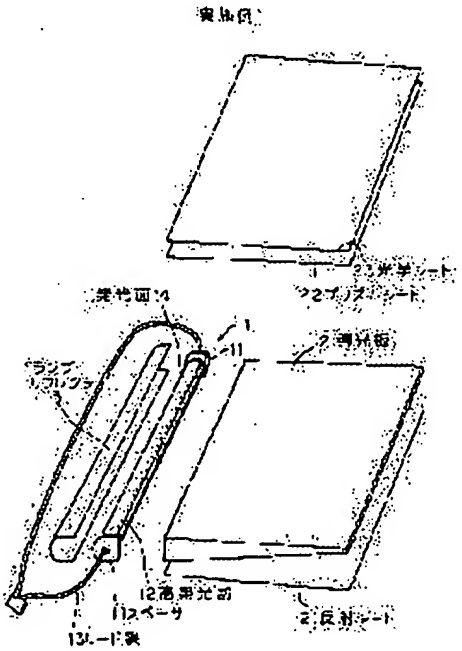
(54) SURFACE LIGHT SOURCE SYSTEM AND DIRECTIONAL TUBE LIGHT SOURCE USING THE SAME

(57)Abstract:
PROBLEM TO BE SOLVED: To easily position a rotational turn angle of a tube light source for maximizing an efficiency of the light to a light guide plate in a surface light source system using a directional tube light source.
SOLUTION: A spacer 11 is incorporated into each end of a tube light source 1. The spacer is engaged with an end surface 2a of a light guide plate 2 and the inner face of a lamp reflector 3 to provide an engaged section 11a, 11b for positioning the angle of the light source 1.



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CLAIMS

[Claim(s)]
[Claim 1] The light guide plate the strength of luminescence in the specific radiation direction carries out outgoing radiation from the main front face, transmitting the light from the tubular light source of the shape of a straight pipe used as max, and said tubular light source by which an end side is made to approach this tubular light source, and incidence is carried out from this end face, In surface light source equipment equipped with the reflecting mirror arranged so that the tubular light source may be covered from an outside The spacer for maintaining predetermined spacing at the both ends of said tubular light source to said reflecting mirror and said light guide plate It prepares for rotation impossible mutually to the luminescence side of said tubular light source. To this spacer Surface light source equipment characterized by engaging with said light guide plate or the frame without front fork which contains this tubular light source, and having the engagement section for rotation positioning for positioning the hand of cut of said tubular light source so that the incident light to said light guide plate may serve as max mostly.
[Claim 2] The tubular light source characterized by equipping both ends with the spacer for positioning a hand of cut so that the direction where the strength of luminescence goes to the plane of incidence of a light guide plate in the tubular light source of the shape of a straight pipe used as max in the specific radiation direction may turn into said specific radiation direction mostly, and making rotation from [said / specific] radiation into impossible.
[Claim 3] The tubular light source according to claim 2 characterized by having the straight-line-like part to which the profile of said spacer extends in an abbreviation tangential direction to said luminescence side in a cross section perpendicular to the medial axis of said tubular light source.
[Claim 4] The tubular light source according to claim 3 to which the inside of said reflecting mirror is characterized by consisting a curved surface of a curve-like part to which the profile of said spacer met the inside of said reflecting mirror in nothing and a cross section perpendicular to the medial axis of said tubular light source, and said straight-line-like part.
[Claim 5] The tubular light source according to claim 3 to which the profile of said spacer is characterized by making an abbreviation polygon in a cross section perpendicular to the medial axis of said tubular light source.
[Claim 6] The tubular light source according to claim 2 characterized by said spacer being created by the part which makes said luminescence side, and coincidence with the same ingredient.
[Claim 7] The tubular light source according to claim 2 characterized by being equipped with said spacer after creation of the part which makes said luminescence side.
[Claim 8] The tubular light source according to claim 2 characterized by putting a cap on said spacer and the engagement section for rotation positioning engaging with said light guide plate or said frame without front fork through this cap.
[Claim 9] The light guide plate the strength of luminescence in the specific radiation direction carries out outgoing radiation from the main front face, transmitting the light from the tubular light source of the shape of a straight pipe used as max, and said tubular light source by which an end side is made to

approach this tubular light source, and incidence is carried out from this end face, Where the spacer which has a flat-surface part is attached in the both ends of said tubular light source in surface light source equipment equipped with the reflecting mirror arranged so that the tubular light source may be covered from an outside Surface light source equipment characterized by being arranged so that said tubular light source and said spacer may be beforehand positioned so that said specific radiation direction may turn to this flat-surface part mostly, and said flat-surface part and incidence end face of said light guide plate may carry out phase opposite mutually at abbreviation parallel.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the surface light source equipment used as a back light of another liquid crystal display and flat-surfaces indicating equipment etc., and the tubular light source used for this.
[0002]
[Description of the Prior Art] Surface light source equipment consists of a light guide plate which carries out outgoing radiation from the main front face, transmitting the light by which incidence is carried out from the tubular light source and this tubular light source. Common surface light source equipment is an edge light (side light) mold with which the tubular light source is arranged along with the end face of a light guide plate.
[0003] An example of the tubular light source used for conventional surface light source equipment and this is explained using drawing 8 .
[0004] Surface light source equipment is the back light of a liquid crystal display, and consists the rectangle-like light guide plate 2, the tubular light source 1 arranged along the side edge side of a light guide plate 2, and this tubular light source 1 of frame members 31 and 32 which contain the wrap reflective mirror 15 and these from the vertical direction and a panel outside.
[0005] The disc-like spacer 11 as for which the shape of a ring and a hole were vacant is inserted in the suitable part for the tubular light source 1, and predetermined spacing is maintained between the luminescence side of the tubular light source 1, and side edge side 2a of the reflective mirror 15 and a light guide plate 2.
[0006] Improvement in the use effectiveness of light source light is achieved by various means, such as arranging at the luminescence side side of a light guide plate 2 on the lens sheet (prism sheet) 22 and the improvement film 23 for Mitsutoshi in a rate, that low-power-izing and high brightness-ization should be attained.
[0007] However, the incidence effectiveness which carries out incidence from the tubular light source 1 to end-face 2a of a light guide plate 2, i.e., the ratio of the incident light to the light guide plate 2 to the amount of luminescence of the tubular light source 1, is only about 50 - 60%. Therefore, if this incidence effectiveness is improved, the effectiveness exerted on improvement in the efficiency for light utilization of the whole surface light source equipment will be large.
[0008] It is examined that (luminous density) uses the large tubular light source 1 in the tubular light source 1 which has directivity, i.e., the strength of luminescence, toward a specific direction as an approach of improving the incidence effectiveness from the tubular light source 1 to a light guide plate 2. By turning the large part of the strength of luminescence to end-face 2a of a light guide plate 2, it is going to raise incidence effectiveness by enlarging the rate of the light which carries out direct incidence, without passing through the reflective mirror 15 from the tubular light source 1 to a light guide plate 2.
[0009]

[Problem(s) to be Solved by the Invention] However, when the tubular light source was a straight pipe-like as it is conventional surface light source equipment as shown in drawing 8 , the activity which assembles the direction where the strength of luminescence serves as max so that it may be made correctly in agreement in the direction which goes to end-face 2a of a light guide plate 2 had taken remarkable time and effort.

[0010] This invention is made in view of the above-mentioned trouble, and offers what can realize easily and certainly positioning of the hand of cut of the tubular light source which is made to make max incidence effectiveness to a light guide plate in the tubular light source which has directivity especially in the tubular light source used for surface light source equipment and this.

[0011]

[Means for Solving the Problem] The tubular light source of the shape of a straight pipe from which, as for the surface light source equipment of claim 1, the strength of luminescence serves as max in the specific radiation direction, In surface light source equipment equipped with the light guide plate which carries out outgoing radiation from the main front face, transmitting the light from said tubular light source by which an end side is made to approach this tubular light source, and incidence is carried out from this end face, and the reflecting mirror arranged so that the tubular light source may be covered from an outside The spacer for maintaining predetermined spacing at the both ends of said tubular light source to said reflecting mirror and said light guide plate It prepares for rotation impossible mutually to the luminescence side of said tubular light source. To this spacer It is characterized by engaging with said light guide plate or the frame without front fork which contains this tubular light source, and having the engagement section for rotation positioning for positioning the hand of cut of said tubular light source so that the incident light to said light guide plate may serve as max.

[0012] Since positioning of the hand of cut of the tubular light source is automatically performed by the above-mentioned configuration in case surface light source equipment is assembled, positioning of the hand of cut of the tubular light source which is made to make max incidence effectiveness to a light guide plate is certainly [easily and] realizable.

[0013] The tubular light source of claim 2 is characterized by equipping both ends with the spacer for positioning a hand of cut so that the direction where the strength of luminescence goes to the plane of incidence of a light guide plate in the tubular light source of the shape of a straight pipe used as max in the specific radiation direction may turn into said specific radiation direction mostly, and making rotation from [said / specific] radiation into impossible.

[0014] The tubular light source of claim 3 is characterized by having the straight-line-like part to which the profile of said spacer extends in an abbreviation tangential direction to said luminescence side in a cross section perpendicular to the medial axis of said tubular light source.

[0015] When a straight-line-like part contacts the end face of a light guide plate, or a frame without front fork, positioning of the hand of cut about the tubular light source is performed by such configuration.

[0016] The tubular light source of claim 6 is characterized by said spacer being created by the part which makes said luminescence side, and coincidence with the same ingredient.

[0017] By such configuration, in order to create said spacer, it is not necessary to add a process, and the activity which positions a hand of cut between the part of a luminescence side and a spacer especially becomes unnecessary.

[0018]

[Embodiment of the Invention] The surface light source equipment of an example is explained using drawing 1 -2. The surface light source equipment of an example is the back light of a liquid crystal display.

[0019] The wrap from the vertical direction and a panel outside and a cross section consist of a falling-sideways [of U characters]-like lamp reflector 3 the tubular light source 1 by which surface light source equipment 10 is arranged along the side edge side by the side of the long side of 1 of the rectangle-like light guide plate 2 and a light guide plate 2, and this tubular light source 1.

[0020] The lamp reflector 3 which consists of a metal sheet plays the role of the reflective mirror which brings together the light source light by which outgoing radiation is carried out from the tubular light

source 1 in the side edge side of a light guide plate 2. The lamp reflector 3 also plays the role of the protective cover which protects the tubular light source 1 from an external impact while playing a role of a frame without front fork which holds and protects the tubular light source 1 again.

[0021] The tubular light source 1 is fluorescence tubing which has directivity. That is, when it sees in a cross section perpendicular to the medial axis of tubing, it is fluorescence tubing designed so that (luminous density) might serve as max in the strength of luminescence in the specific radiation direction. In detail, as shown all over drawing, the band-like high light-emitting part (called "opening") 12 prolonged in shaft orientations is formed in the luminescence side 14 of the shape of a cylinder which makes the tubular light source 1, and the strength of luminescence from this high light-emitting part 12 is designed so that it may become large notably rather than the strength of luminescence from other fields in the luminescence side 14.

[0022] Spacing of the luminescence side 14 and the lamp reflector 3 and spacing of the luminescence side 14 and a transparent material 2 are maintained at a predetermined value, respectively, and the both ends of the tubular light source 1 to which lead wire 13 is connected are equipped with the spacer 11 for preventing decline in luminous efficiency. This spacer 11 is formed so that the glass tube and one which make the luminescence side 14 of the tubular light source 1 may be made.

[0023] In this example, a spacer 11 is created by coincidence with the same ingredient as this glass tube. Moreover, the spacer 11 of this example is formed in the form where a peripheral face meets the inside of the lamp reflector 3, and end-face 2a of a transparent material 2. That is, when it sees in a cross section perpendicular to the medial axis of the tubular light source 1, a spacer 11 consists of a U typeface curve corresponding to the inside of the lamp reflector 3, and a straight-line part corresponding to end-face 2a of a light guide plate 2.

[0024] In the above-mentioned cross section, the straight-line part of a spacer 11 is created so that it may become almost parallel to the tangent of the luminescence side 14 in the high light-emitting part 12, and the tangent in the main part of the cross direction of the high light-emitting part 12 especially. Therefore, when the tubular light source 1 is contained between a light guide plate 2 and the lamp reflector 3, and the straight-line part of a spacer 11 is joined to end-face 2a of a light guide plate 2, it is arranged so that the core of the cross direction of the high light-emitting part 12 may turn to correctly the incidence end-face 2a side of a light guide plate 2.

[0025] If it puts in another way, the spacer 11 is jutted out in the above-mentioned cross section to the corner of the upper and lower sides to which the lamp reflector 3 and incidence end-face 2a are joined. And the corner plate-like overhang section of these upper and lower sides is making the engagement sections 11a and 11b (an alternate long and short dash line shows a field in drawing 2 .) for rotation positioning, respectively. That is, the engagement sections 11a and 11b for rotation positioning of the shape of a corner plate jutted out of the spacer 11 position the hand of cut of the tubular light source 1 by engaging with the inside of end-face 2a of a light guide plate 2, and the lamp reflector 3.

[0026] Since the tubular light source 1 is equipped with the spacer 11 which has such the engagement sections 11a and 11b for rotation positioning, in case surface light source equipment 10 is assembled, the activity for positioning the tubular light source 1 to a hand of cut is completely unnecessary, and, moreover, positioning is performed correctly.

[0027] Compared with the case where the tubular light source without directivity is used, efficiency for light utilization can be raised 10%, for example by arranging so that the high light-emitting part 12 may turn to end-face 2a of a light guide plate 2 correctly as the tubular light source 1, using a directive thing.

[0028] In addition, as shown in drawing 1 , a light guide plate 2 is a "wedge mold" with which thickness becomes small as it becomes far from the incidence side edge side in alignment with the tubular light source 1. Moreover, the reflective sheet 21 is arranged on the rear face of a light guide plate 2, and the condensing sheet 22 and the improvement film 23 for Mitsutoshi in a rate are arranged on the field on the side front of a light guide plate 2, i.e., the main front face which carries out outgoing radiation of the light.

[0029] The prism sheet of two sheets piles up the condensing sheet 22 on the diffusion sheet of one sheet, it is arranged densely and each prism sheet becomes so that the protruding line of detailed a large

number which make a cross-section abbreviation equilateral triangle may cover a top face. The improvement film 23 for Mitsutoshi in a rate carries out the laminating of the thin film with which refractive indexes differ, controlling the thickness, penetrates the light of the polarization direction of 1 alternatively, reflects in a light guide plate 2 side, and returns the light of other polarization directions.
[0030] It combines with the plastics frame which contained a light guide plate and this, after containing the tubular light source 1 in the lamp reflector 3, in case surface light source equipment 10 is assembled.

[0031] Next, a modification is explained using drawing 3 -7.
[0032] In the modification 1 shown in drawing 3 , in the same configuration as the above-mentioned example, a spacer 11 is a product made of silicone rubber, and is attached in rotation impossible to this body part after formation of the part (body part) of the luminescence side 14 of the tubular light source 1.
[0033] The almost same effectiveness as the above-mentioned example is acquired also by such configuration. Here, in case the body part of the tubular light source 1 is created, the projection part for positioning the hand of cut to a spacer 11 etc. may be prepared in behind.
[0034] In the modification 2 shown in drawing 4 , the cap 16 made of silicone rubber is put on the spacer 11 in the same configuration as the above-mentioned example. While the same effectiveness as the above-mentioned example is acquired by this, when an impact is added to lamp reflector 3 grade, transfer of the impact to the tubular light source 1 can be controlled.
[0035] although it is prepared in the example of illustration so that cap 16 may make the thickness of about 1 law along with the peripheral face of a spacer 11, a slot is established in a part of peripheral face of a spacer 11, and you may engage with the projection of the inside of cap 16, for example.
[0036] In the modification 3 shown in drawing 5 , a spacer 11 is a rectangle-like in a cross section perpendicular to the medial axis of the tubular light source 1. The tubular light source 1 is contained in the space of the shape of a cross-section rectangle surrounded by the plastics frame 31 which contains a light guide plate 2, the bezel covering 32, and the light guide plate 2, and it is formed so that the periphery of a spacer 11 may meet the wall surface of this space. In addition, wrap reflective mirror 21a is formed in the reflective sheet 21 and one from the upper and lower sides and an outside in the tubular light source 1.
[0037] In the modification 4 shown in drawing 6 , the angle at the tip of the engagement sections 11a and 11b for rotation positioning is rounded in the same configuration as the example shown in drawing 1 -2. Moreover, in the modification 5 shown in drawing 7 , only one engagement section 11a for rotation positioning is prepared in each spacer 11. The same effectiveness as an example is acquired also according to modifications 4-5.
[0038] In the above-mentioned example and a modification, although explained that surface light source equipment was the back light of a transparency form liquid crystal display, it is also completely the same as when it is the front light of a reflex liquid crystal display.
[0039]
[Effect of the Invention] In the tubular light source which has directivity, and the surface light source equipment using this, positioning of the hand of cut of the tubular light source which is made to make max incidence effectiveness to a light guide plate is certainly [easily and] realizable.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the surface light source equipment used as a back light of another liquid crystal display and flat-surfaces indicating equipment etc., and the tubular light source used for this.

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PRIOR ART

[Description of the Prior Art] Surface light source equipment consists of a light guide plate which carries out outgoing radiation from the main front face, transmitting the light by which incidence is carried out from the tubular light source and this tubular light source. Common surface light source equipment is an edge light (side light) mold with which the tubular light source is arranged along with the end face of a light guide plate.
[0003] An example of the tubular light source used for conventional surface light source equipment and this is explained using drawing 8 .
[0004] Surface light source equipment is the back light of a liquid crystal display, and consists the rectangle-like light guide plate 2, the tubular light source 1 arranged along the side edge side of a light guide plate 2, and this tubular light source 1 of frame members 31 and 32 which contain the wrap reflective mirror 15 and these from the vertical direction and a panel outside.
[0005] The disc-like spacer 11 as for which the shape of a ring and a hole were vacant is inserted in the suitable part for the tubular light source 1, and predetermined spacing is maintained between the luminescence side of the tubular light source 1, and side edge side 2a of the reflective mirror 15 and a light guide plate 2.
[0006] Improvement in the use effectiveness of light source light is achieved by various means, such as arranging at the luminescence side side of a light guide plate 2 on the lens sheet (prism sheet) 22 and the improvement film 23 for Mitsutoshi in a rate, that low-power-izing and high brightness-ization should be attained.
[0007] However, the incidence effectiveness which carries out incidence from the tubular light source 1 to end-face 2a of a light guide plate 2, i.e., the ratio of the incident light to the light guide plate 2 to the amount of luminescence of the tubular light source 1, is only about 50 - 60%. Therefore, if this incidence effectiveness is improved, the effectiveness exerted on improvement in the efficiency for light utilization of the whole surface light source equipment will be large.
[0008] It is examined that (luminous density) uses the large tubular light source 1 in the tubular light source 1 which has directivity, i.e., the strength of luminescence, toward a specific direction as an approach of improving the incidence effectiveness from the tubular light source 1 to a light guide plate 2. By turning the large part of the strength of luminescence to end-face 2a of a light guide plate 2, it is going to raise incidence effectiveness by enlarging the rate of the light which carries out direct incidence, without passing through the reflective mirror 15 from the tubular light source 1 to a light guide plate 2.

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EFFECT OF THE INVENTION

[Effect of the Invention] In the tubular light source which has directivity, and the surface light source equipment using this, positioning of the hand of cut of the tubular light source which is made to make max incidence effectiveness to a light guide plate is certainly [easily and] realizable.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, when the tubular light source was a straight pipe-like as it is conventional surface light source equipment as shown in drawing 8 , the activity which assembles the direction where the strength of luminescence serves as max so that it may be made correctly in agreement in the direction which goes to end-face 2a of a light guide plate 2 had taken remarkable time and effort.
[0010] This invention is made in view of the above-mentioned trouble, and offers what can realize easily and certainly positioning of the hand of cut of the tubular light source which is made to make max incidence effectiveness to a light guide plate in the tubular light source which has directivity especially in the tubular light source used for surface light source equipment and this.

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MEANS

[Means for Solving the Problem] The tubular light source of the shape of a straight pipe from which, as for the surface light source equipment of claim 1, the strength of luminescence serves as max in the specific radiation direction, In surface light source equipment equipped with the light guide plate which carries out outgoing radiation from the main front face, transmitting the light from said tubular light source by which an end side is made to approach this tubular light source, and incidence is carried out from this end face, and the reflecting mirror arranged so that the tubular light source may be covered from an outside The spacer for maintaining predetermined spacing at the both ends of said tubular light source to said reflecting mirror and said light guide plate It prepares for rotation impossible mutually to the luminescence side of said tubular light source. To this spacer It is characterized by engaging with said light guide plate or the frame without front fork which contains this tubular light source, and having the engagement section for rotation positioning for positioning the hand of cut of said tubular light source so that the incident light to said light guide plate may serve as max.
[0012] Since positioning of the hand of cut of the tubular light source is automatically performed by the above-mentioned configuration in case surface light source equipment is assembled, positioning of the hand of cut of the tubular light source which is made to make max incidence effectiveness to a light guide plate is certainly [easily and] realizable.
[0013] The tubular light source of claim 2 is characterized by equipping both ends with the spacer for positioning a hand of cut so that the direction where the strength of luminescence goes to the plane of incidence of a light guide plate in the tubular light source of the shape of a straight pipe used as max in the specific radiation direction may turn into said specific radiation direction mostly, and making rotation from [said / specific] radiation into impossible.
[0014] The tubular light source of claim 3 is characterized by having the straight-line-like part to which the profile of said spacer extends in an abbreviation tangential direction to said luminescence side in a cross section perpendicular to the medial axis of said tubular light source.
[0015] When a straight-line-like part contacts the end face of a light guide plate, or a frame without front fork, positioning of the hand of cut about the tubular light source is performed by such configuration.
[0016] The tubular light source of claim 6 is characterized by said spacer being created by the part which makes said luminescence side, and coincidence with the same ingredient.
[0017] By such configuration, in order to create said spacer, it is not necessary to add a process, and the activity which positions a hand of cut between the part of a luminescence side and a spacer especially becomes unnecessary.
[0018]
[Embodiment of the Invention] The surface light source equipment of an example is explained using drawing 1 -2. The surface light source equipment of an example is the back light of a liquid crystal display.
[0019] The wrap from the vertical direction and a panel outside and a cross section consist of a falling-sideways [of U characters]-like lamp reflector 3 the tubular light source 1 by which surface light source equipment 10 is arranged along the side edge side by the side of the long side of 1 of the rectangle-like

light guide plate 2 and a light guide plate 2, and this tubular light source 1.
[0020] The lamp reflector 3 which consists of a metal sheet plays the role of the reflective mirror which brings together the light source light by which outgoing radiation is carried out from the tubular light source 1 in the side edge side of a light guide plate 2. The lamp reflector 3 also plays the role of the protective cover which protects the tubular light source 1 from an external impact while playing a role of a frame without front fork which holds and protects the tubular light source 1 again.
[0021] The tubular light source 1 is fluorescence tubing which has directivity. That is, when it sees in a cross section perpendicular to the medial axis of tubing, it is fluorescence tubing designed so that (luminous density) might serve as max in the strength of luminescence in the specific radiation direction. In detail, as shown all over drawing, the band-like high light-emitting part (called "opening") 12 prolonged in shaft orientations is formed in the luminescence side 14 of the shape of a cylinder which makes the tubular light source 1, and the strength of luminescence from this high light-emitting part 12 is designed so that it may become large notably rather than the strength of luminescence from other fields in the luminescence side 14.
[0022] Spacing of the luminescence side 14 and the lamp reflector 3 and spacing of the luminescence side 14 and a transparent material 2 are maintained at a predetermined value, respectively, and the both ends of the tubular light source 1 to which lead wire 13 is connected are equipped with the spacer 11 for preventing decline in luminous efficiency. This spacer 11 is formed so that the glass tube and one which make the luminescence side 14 of the tubular light source 1 may be made.
[0023] In this example, a spacer 11 is created by coincidence with the same ingredient as this glass tube. Moreover, the spacer 11 of this example is formed in the form where a peripheral face meets the inside of the lamp reflector 3, and end-face 2a of a transparent material 2. That is, when it sees in a cross section perpendicular to the medial axis of the tubular light source 1, a spacer 11 consists of a U typeface curve corresponding to the inside of the lamp reflector 3, and a straight-line part corresponding to end-face 2a of a light guide plate 2.
[0024] In the above-mentioned cross section, the straight-line part of a spacer 11 is created so that it may become almost parallel to the tangent of the luminescence side 14 in the high light-emitting part 12, and the tangent in the main part of the cross direction of the high light-emitting part 12 especially. Therefore, when the tubular light source 1 is contained between a light guide plate 2 and the lamp reflector 3, and the straight-line part of a spacer 11 is joined to end-face 2a of a light guide plate 2, it is arranged so that the core of the cross direction of the high light-emitting part 12 may turn to correctly the incidence end-face 2a side of a light guide plate 2.
[0025] If it puts in another way, the spacer 11 is jutted out in the above-mentioned cross section to the corner of the upper and lower sides to which the lamp reflector 3 and incidence end-face 2a are joined. And the corner plate-like overhang section of these upper and lower sides is making the engagement sections 11a and 11b (an alternate long and short dash line shows a field in drawing 2 .) for rotation positioning, respectively. That is, the engagement sections 11a and 11b for rotation positioning of the shape of a corner plate jutted out of the spacer 11 position the hand of cut of the tubular light source 1 by engaging with the inside of end-face 2a of a light guide plate 2, and the lamp reflector 3.
[0026] Since the tubular light source 1 is equipped with the spacer 11 which has such the engagement sections 11a and 11b for rotation positioning, in case surface light source equipment 10 is assembled, the activity for positioning the tubular light source 1 to a hand of cut is completely unnecessary, and, moreover, positioning is performed correctly.
[0027] Compared with the case where the tubular light source without directivity is used, efficiency for light utilization can be raised 10%, for example by arranging so that the high light-emitting part 12 may turn to end-face 2a of a light guide plate 2 correctly as the tubular light source 1, using a directive thing.
[0028] In addition, as shown in drawing 1 , a light guide plate 2 is a "wedge mold" with which thickness becomes small as it becomes far from the incidence side edge side in alignment with the tubular light source 1. Moreover, the reflective sheet 21 is arranged on the rear face of a light guide plate 2, and the condensing sheet 22 and the improvement film 23 for Mitsutoshi in a rate are arranged on the field on the side front of a light guide plate 2, i.e., the main front face which carries out outgoing radiation of the

light.
[0029] The prism sheet of two sheets piles up the condensing sheet 22 on the diffusion sheet of one sheet, it is arranged densely and each prism sheet becomes so that the protruding line of detailed a large number which make a cross-section abbreviation equilateral triangle may cover a top face. The improvement film 23 for Mitsutoshi in a rate carries out the laminating of the thin film with which refractive indexes differ, controlling the thickness, penetrates the light of the polarization direction of 1 alternatively, reflects in a light guide plate 2 side, and returns the light of other polarization directions.
[0030] It combines with the plastics frame which contained a light guide plate and this, after containing the tubular light source 1 in the lamp reflector 3, in case surface light source equipment 10 is assembled.

[0031] Next, a modification is explained using drawing 3 -7.
[0032] In the modification 1 shown in drawing 3 , in the same configuration as the above-mentioned example, a spacer 11 is a product made of silicone rubber, and is attached in rotation impossible to this body part after formation of the part (body part) of the luminescence side 14 of the tubular light source 1.
[0033] The almost same effectiveness as the above-mentioned example is acquired also by such configuration. Here, in case the body part of the tubular light source 1 is created, the projection part for positioning the hand of cut to a spacer 11 etc. may be prepared in behind.
[0034] In the modification 2 shown in drawing 4 , the cap 16 made of silicone rubber is put on the spacer 11 in the same configuration as the above-mentioned example. While the same effectiveness as the above-mentioned example is acquired by this, when an impact is added to lamp reflector 3 grade, transfer of the impact to the tubular light source 1 can be controlled.
[0035] although it is prepared in the example of illustration so that cap 16 may make the thickness of about 1 law along with the peripheral face of a spacer 11, a slot is established in a part of peripheral face of a spacer 11, and you may engage with the projection of the inside of cap 16, for example.
[0036] In the modification 3 shown in drawing 5 , a spacer 11 is a rectangle-like in a cross section perpendicular to the medial axis of the tubular light source 1. The tubular light source 1 is contained in the space of the shape of a cross-section rectangle surrounded by the plastics frame 31 which contains a light guide plate 2, the bezel covering 32, and the light guide plate 2, and it is formed so that the periphery of a spacer 11 may meet the wall surface of this space. In addition, wrap reflective mirror 21a is formed in the reflective sheet 21 and one from the upper and lower sides and an outside in the tubular light source 1.
[0037] In the modification 4 shown in drawing 6 , the angle at the tip of the engagement sections 11a and 11b for rotation positioning is rounded in the same configuration as the example shown in drawing 1 -2. Moreover, in the modification 5 shown in drawing 7 , only one engagement section 11a for rotation positioning is prepared in each spacer 11. The same effectiveness as an example is acquired also according to modifications 4-5.
[0038] In the above-mentioned example and a modification, although explained that surface light source equipment was the back light of a transparency form liquid crystal display, it is also completely the same as when it is the front light of a reflex liquid crystal display.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the decomposition perspective view showing typically the surface light source equipment of the example of this invention.
[Drawing 2] It is important section drawing of longitudinal section for explaining the surface light source equipment of drawing 1 further.
[Drawing 3] It is important section drawing of longitudinal section showing the surface light source equipment of a modification 1 typically.
[Drawing 4] It is important section drawing of longitudinal section showing the surface light source equipment of a modification 2 typically.
[Drawing 5] It is important section drawing of longitudinal section showing the surface light source equipment of a modification 3 typically.
[Drawing 6] It is important section drawing of longitudinal section showing the surface light source equipment of a modification 4 typically.
[Drawing 7] It is important section drawing of longitudinal section showing the surface light source equipment of a modification 5 typically.
[Drawing 8] It is important section drawing of longitudinal section showing typically the surface light source equipment in a Prior art.
[Description of Notations]
1 Tubular Light Source
11 Spacer
11a, 11b The engagement section for rotation positioning
12 High Light-emitting Part
13 Lead Wire
14 Luminescence Side
2 Light Guide Plate
21 Reflective Sheet
22 Condensing Sheet
23 Improvement Film for Mitsutoshi in Rate
3 Lamp Reflector

[Translation done.]

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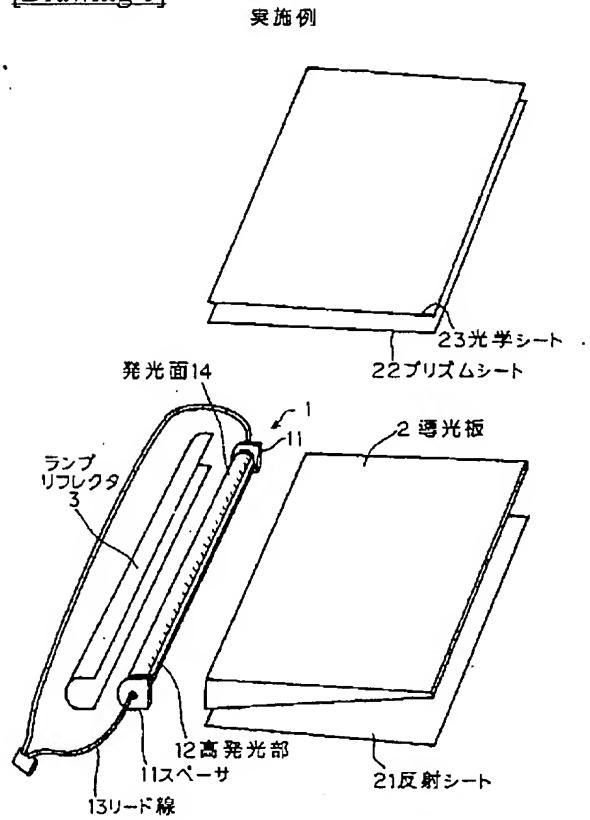
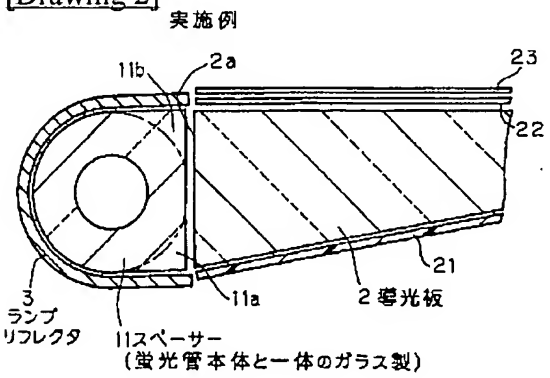
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]

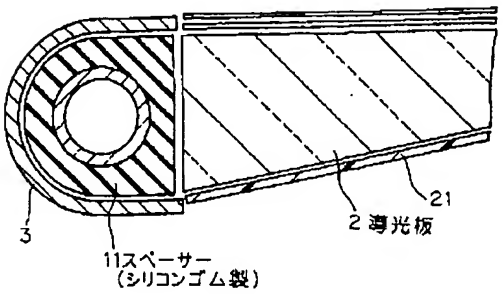


[Drawing 2]



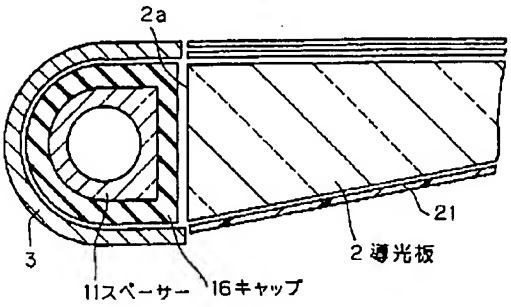
[Drawing 3]

変形例1



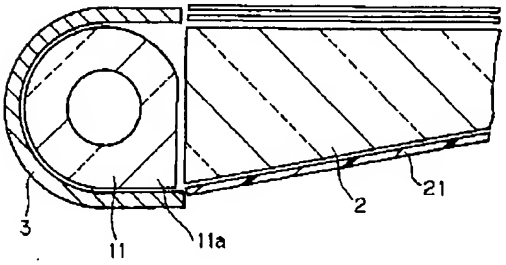
[Drawing 4]

変形例2



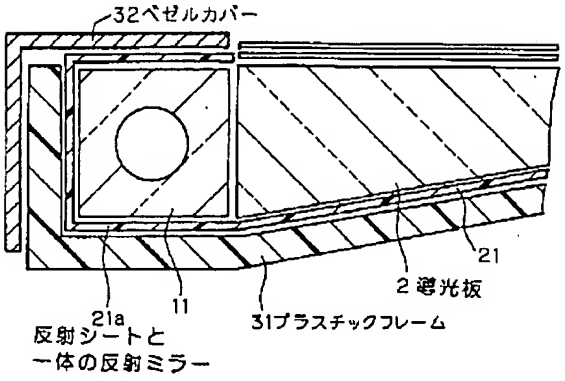
[Drawing 7]

変形例5



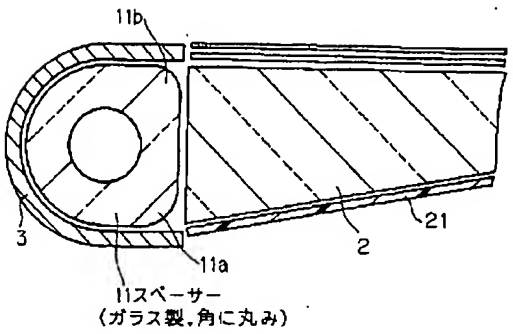
[Drawing 5]

変形例3



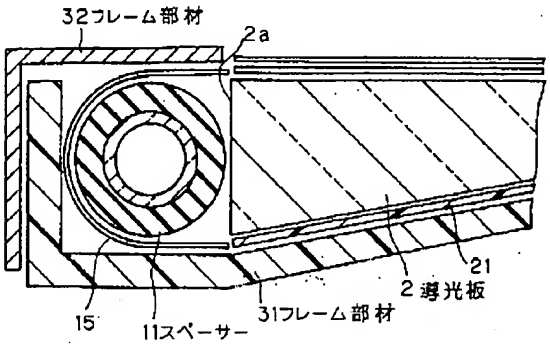
[Drawing 6]

変形例4



[Drawing 8]

従来技術



[Translation done.]